

TECHNICAL BULLETIN #06080301

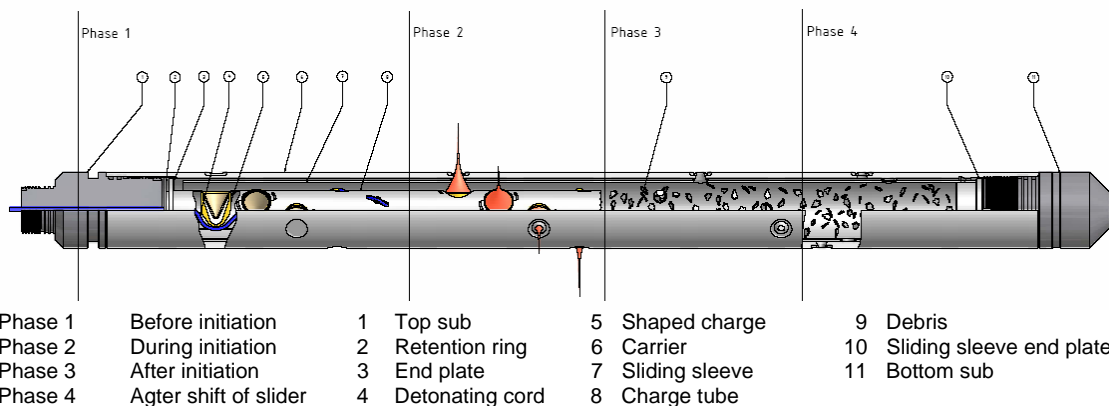
How clean can you get? - No Debris Gun System (NDG)

Perforating jobs traditionally leave a lot of unwanted debris in the well. The interior of the perforating guns and the cases of the shaped charges are fragmented during the shot. Up to several hundred gram/shot can be left in the well. For long horizontal wells this could sum up to tons of steel chips and other debris that may harm sensitive down hole and surface equipment. A possible solution to this problem in the past was the use of zinc case instead of steel case shaped charges. After perforating the zinc charge cases break up into fine particles which normally are not a threat to the well or which can be dissolved during an acid treatment. Unfortunately the zinc particles react with certain brines creating down hole problems. To overcome this situation **DYNAenergetics** has developed a new type of perforating gun system. This patent pending No-Debris Gun System (NDG) leaves essentially no debris in the well. The basic idea behind the system is to close the shot holes in the gun after the shot. This is achieved by an internal sliding sleeve. An internal piston which is activated by the gas pressure produced during the detonation shifts the sleeve. While the jet of the shaped charge has penetrated the slider and the outer wall of the gun in 1/10 ms the shift of the slider takes several ms. The gas pressure not only shifts the slider but also expands the sleeve and seizes it into its new position. A subsequent reopening of the shot holes is hereby prevented. The gun is in no way pressure tight. Fluid and gas can still circulate between the inside of the gun and the well bore, making the trapping of pressure impossible.

Tests with the NDG made in accordance with the new API RP 19b Section V standard* which is under development by the API 19B sub-committee have proven that no debris can exit the gun during or after the shot. The rotation test in Phase II of the procedure which demands 100 revolutions of the gun assembly after the shot can be repeated indefinitely without any debris exiting from the gun.

The NDG can be used with any standard shaped charge independent of size, geometry or explosive type. QC shots with shaped charges in a NDG setup have shown little or no penetration loss. Field testing and an API RP 19b Section I test with **DYNAenergetics** DYNAWELL Shaped Charges are under preparation.

* Standard also according to Norsk Hydro specifications



Revision: FP06080301